US006312971B1

(12) **United States Patent**
Amundson et al.

(10) **Patent No.: US 6,312,971 B1**
(45) **Date of Patent: Nov. 6, 2001**

(54) **SOLVENT ANNEALING PROCESS FOR FORMING A THIN SEMICONDUCTOR FILM WITH ADVANTAGEOUS PROPERTIES**

(75) Inventors: **Karl Amundson**, Cambridge; **Jianna Wang**, Waltham, both of MA (US)

(73) Assignee: **E Ink Corporation**, Cambridge, MA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/652,486**

(22) Filed: **Aug. 31, 2000**

Related U.S. Application Data

(60) Provisional application No. 60/151,547, filed on Aug. 31, 1999.

(51) **Int. Cl.**[7] **H01L 51/40**
(52) **U.S. Cl.** **438/99**
(58) **Field of Search** 438/22, 34, 99, 438/142, 149; 257/40, 213

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Primary Examiner—Charles Bowers
Assistant Examiner—Keith Christianson
(74) *Attorney, Agent, or Firm*—Testa, Hurwitz & Thibeault, LLP

(57) **ABSTRACT**

A process for forming a relatively high quality, lower cost organic semiconductor film is provided. A substrate is formed by depositing an organic semiconductor film via a lower cost method such as printing or spin coating on a support substrate. A portion of a solvent is vaporized to bring the vapor into contact with the film. The chemical potential of the vapor molecules is controlled to provide an interaction with the organic semiconductor film to alter the molecular arrangement of the film. The process further entails placing the substrate on a first temperature controlled stage and placing the solvent on a second temperature controlled stage. The chemical potential of the vapor is adjusted by controlling the temperature of the solvent. Appropriate annealing conditions are obtained by adjusting the temperature of the solvent, the substrate, and the anneal time. The process can assist manufacturing of lower cost displays that utilize arrays of organic thin-film transistors.

18 Claims, 2 Drawing Sheets